Science Advisory Subcommittee Report to the Air Toxics Advisory Committee:

Verification Projects for Phase II of the Maine Air Toxics Initiative With Recommended Follow-up Actions

Revision of June 7, 2007

The Air Toxics Advisory Committee (ATAC) established the Science Advisory Subcommittee (SAS) in November of 2005 to continue to evaluate and verify the scientific data used in phase I of the Maine Air Toxics Initiative (MATI). Specifically, the ATAC charged SAS with verifying the scientific underpinnings of the Air Toxics Priority List; locating regions of the state where air toxics are of particular concern; and evaluating the assumptions that underlie air toxics reduction options. In addition to this broad scope of work, the ATAC tasked SAS with further verification of several other scientific issues from the ATAC's Phase I work and assisting the other two subcommittees when needed. This report summarizes the work of the SAS during Phase II of the Maine Air Toxics Initiative.

Toxicity-Factor Revisions

The amount of an air toxic that can be breathed without causing an adverse impact varies widely. Therefore, the MATI inventory is presented as a "Toxicity-Weighted" emissions inventory; tons of emissions are multiplied by Toxicity-Factors that are specific to each pollutant in order to allow a comparison on a common weighting scale. During the verification phase, SAS also assisted MEDEP and the Maine Center for Disease Control (MECDC - formerly the Maine Department of Human Services) with revising the toxicity-factors that MEDEP used to weight the inventory. These revisions bring the toxicity-factors into alignment with the risk endpoints used in establishing Maine's Ambient Air Guidelines, in addition to capturing the latest available data on toxicity. The revised toxicity-factors, and a narrative on their use and derivation, is available at: http://www.maine.gov/dep/air/toxics/mati-docs.htm.

Inventory Revisions

In Phase I of MATI, the ATAC identified numerous improvement opportunities for the DEP's air toxics inventory. The SAS recommended that the MEDEP improve the transparency, accuracy, and reproducibility of the Hazardous Air Pollutant (HAP) emissions inventory of point sources. To accomplish these goals, for large facilities for emission year 2005, MEDEP overhauled the electronic reporting protocols, and stepped-up its quality assurance review process. Revised reporting guidance and protocols is available on the DEP's Emissions Inventory Website at: http://www.maine.gov/dep/air/emissions/haps-rptng.htm.

SAS input also led to improvements in the Department's emission estimates for residential wood combustion, on-road mobile sources, and non-road mobile emission estimates. Additionally, the transparency and reproducibility of MEDEP inventory has improved. The MEDEP is now poised to improve future estimates of marine vessel, railroad, and airport emissions; increase the speed of inventory development; develop web-based reporting tools for large stationary sources; and increase the public availability of inventory data. Further, MEDEP is working with EPA on national workgroups to use the lessons-learned from MATI to improve emissions inventories

across the US. The revised MATI inventory, Mobile Emission Projections, and summary tables are posted on the MATI website at: http://www.maine.gov/dep/air/toxics/mati-docs.htm.

MEDEP is continuously improving the accuracy, reproducibility, and transparency of its emissions inventory and the MATI process has been vital to these improvements. However, this means that the inventory is necessarily dynamic; as conditions change, the science evolves, and sampling/testing is refined, the priority list may change and as such, source and air toxic priorities may change. The revised 2005 toxicity-weighted inventory is significantly different from the previous estimated 2005 inventory due to inventory improvements, significant changes in toxicity-factors, use of different units and better guidance to point sources resulting in consistent inclusion of combustion HAPs.

Due to these improvements, the earlier projected inventory is not directly comparable to the revised inventory. However, air toxics from combustion sources still dominate the toxicity-weighted emissions, and reduction of combustion HAPs is the target of both the Mobile and Stationary Sources recommended reduction strategies. These strategies will also have the co-benefit of reducing Green House Gas and Criteria Pollutant emissions.

Recommendation for ATAC consideration: While undertaking these revisions, one of the pollutants that was on the ATPL, 2, 4 toluene diisocyanate (2,4 TDI), was found to no longer be emitted from the graphic arts industry. With this change and better emissions from the point source sector, virtually zero 2,4 TDI is emitted in the state. Therefore, SAS recommends that this pollutant be dropped from the ATPL

Acrolein

EPA's most recent National Air Toxics Assessment (NATA) found that Acrolein is a state, regional, and national risk driver for air toxics. MATI's phase I data also found that Acrolein is an air toxic of relatively high concern. However, the ATAC also found that there was significant uncertainty concerning the actual risks posed by this compound. MEDEP developed a white paper, "Acrolein: Air Quality Science and Policy Issues (revision of October, 24 2006)", that summarized the current science and uncertainty behind the toxicity, emissions, and ambient concentrations of acrolein. SAS and the Stationary Sources Subcommittee (SSS) reviewed the acrolein white paper and provided comments and inputs to the MEDEP, which has not been revised at this date. In general, due to the high uncertainty in the science underlying the emission factors, chemical analysis, toxicity-factors and modeling of acrolein, the subcommittee did not reach agreement on the risk currently posed by ambient concentrations of acrolein.

To help resolve the high uncertainty with EPA's acrolein emission factor for large industrial wood boilers, and the SAS's lack of success in having EPA review the factor's basis, the largest stationary sources in Maine that burn wood initiated source-specific stack-testing. Additionally, MEDEP undertook a study to refine its approach to sampling and analyzing acrolein in ambient air at its HAP sampling locations across the state. This study helped support the MEDEP's application to EPA for an Air Toxics Monitoring Grant, aimed in part at purchasing new equipment to accurately sample and analyze acrolein in ambient air. EPA intends to announce Grant recipients after July 1, 2007.

Ambient Air Data

Maine DEP extracted ambient air data from its HAP monitoring programs to update HAP trends, which are available at http://www.maine.gov/dep/air/toxics/mati-docs.htm. Since 1997, MEDEP has monitored for HAPs off and on at about a dozen locations across the state for various HAPs. MEDEP does not have the resources to monitor at all locations of potential impact. Nonetheless, the HAP data, coupled with emissions and modeling, can be instructive as to ambient concentrations of HAPs in Maine. The ambient HAP monitoring data shows that background levels of metals are low as compared to Maine Ambient Air Guidelines (MAAGs). Average Benzene concentrations exceed MAAGs over the Interstate 95 corridor in Portland, but are generally well below MAAG at background locations. A spot check of acrolein at locations where HAPs have historically been the highest, suggests that acrolein may exceed the MAAG by over 10 times; however, it must be noted that acrolein is extremely hard to accurately measure and there are very few ambient air monitoring results in the state of Maine. One HAP on the ATPL, carbon tetrachloride, has low current emissions, but due to persistence continues be high in ambient air relative to MAAGs.

Hotspot analysis

In phase I of MATI, risk calculations were only available at a state-wide and county-wide level. However, the ATAC found that achieving the MAAG for individual air toxics based on average county-wide exposure is not a true reflection of the potential risk attributed to air toxics. Therefore, the ATAC directed the science advisory subcommittee to evaluate hot-spot exposures at localized areas of highest impact. The subcommittee reviewed EPA's 1999 National Air Toxics Assessment, traffic congestion, ambient air monitoring data and point source emissions, in an effort to locate areas of the state that are likely to have the highest air toxic impacts. Overall, however, this evaluation is incomplete and point and area source hot-spots have not been adequately defined.

Mobile Sources: In order to assess potential air toxic hot spots from mobile sources, SAS worked with the Mobile Source Subcommittee. The Maine Department of Transportation (DOT) analyzed high traffic areas in Maine by compiling annual average daily traffic versus the road capacity for all of the road segments in Maine. DOT compared this information to a table to determine the average speed for all the road segments. For traffic density on each road segment, DOT divided the annual average traffic by the speed to obtain the number of vehicles hours of travel per day. DOT ranked the segments from highest traffic density to lowest. This screening analysis is available in an excel workbook, and is plotted on interactive pdf maps. See http://www.maine.gov/dep/air/toxics/mati-docs.htm for maps. These maps provide an excellent screening assessment of potential mobile source hot-spot locations.

Area Sources: Maine DEP extracted from the 1999 National Air Toxics Assessment (1999 NATA) the risk estimations for the highest cancer and non-cancer census tracts in the state. The hope was that this information might be able to assess hot-spot locations from area sources. However, this approach was not fruitful, so further evaluation is needed.

Point Sources: The MEDEP attempted to use historic modeling results for Criteria Air Pollutants (CAPs) from select facilities to assess potential hot spots from point sources. The approach was to use the ratio of HAPs to CAPs at the facility and area of highest ground level impact (known as the "Point of Impingement"). However, recent CAP modeling was not

available for any of the facilities that were among the top toxicity-weighted emissions, so this approach was not fruitful. Therefore, further evaluation is needed.

Ambient Monitoring Results: Some HAP monitoring sites have been located in areas the MEDEP believed to be highly impacted by local emission sources, such as the former BEAM site in Portland. However, MEDEP did not establish HAP monitoring locations at the point of impingement of the current highest emission sources. Based on emissions inventories, the mobile source hot-spot maps, and existing monitoring results, MEDEP has applied for an air toxics monitoring grant to evaluate potential hot-spots in Portland, Maine's largest city. If awarded this grant, MEDEP will be able to evaluate the "patchiness" of HAP impacts in Portland, and use this information to assess other monitoring sites in the state.

Recommendation to ATAC: MEDEP should first focus on identifying hot-spots stemming from emissions from point and area sources. The MEDEP should then continue to routinely identify and evaluate potential risk attributed to air toxics in hot-spots. The MEDEP should consider cumulative exposure to multiple air toxics, bioaccumulation, transport/background concentrations, and environmental persistence of air toxics in this evaluation.

Risk Assessment Protocols and Risk Communication

During phase I of the MATI, the ATAC raised several issues regarding how MEDEP and MECDC conduct risk assessments and communicate risk results. It became apparent that many of these issues stemmed from a lack of common understanding of the current risk assessment process. Therefore, MEDEP, in consultation with SAS and SSS, used the Healthy Communities Grant money to host a Risk Assessment Training course for 34 members of the MEDEP and ATAC. This training, held October 25 – 27, 2006, taught the risk assessment protocols spelled out in the Air Toxics Risk Assessment Reference Library[1]. Joann Held, a retired risk assessor from the NJ DEP, and Marybeth Smuts, EPA Region I toxicologist, were the primary instructors for the course. The participants provided positive comments on the course. MEDEP will continue to use the risk assessment protocols in the Air Toxics Risk Assessment Reference Library when conducting risk assessments.

Recommendation to ATAC: While the protocols now exist for risk assessment, the subcommittee also decided that conducting detailed risk assessment on the vast majority of stationary sources in the state is not a prudent use of resources. Rather, SAS and SSS recommend that these resources be used to foster HAP reductions at emission sources, primarily through energy efficiency evaluations and improvements. However, risk assessment protocols may be appropriate for evaluation of potential hot-spots, as discussed above.

Early Actions

Outdoor wood boilers – SAS helped the Stationary Sources Subcommittee drafted a white paper that explored impacts from Outdoor Wood Boilers (OWBs) that are used for residential heating. This white paper documented the available information, and concluded that OWBs are a growing emission source with high localized HAP impacts that is not subject to federal

[1] See EPA's Website at: http://www.epa.gov/ttn/fera/risk_atra_main.html

regulation. This white paper was then used as the basis for a recommended early action on OWBs. The early action of December 12, 2007, recommended that the Commissioner of DEP impose a moratorium and meaningful regulation on Outdoor Wood Boilers.

Environmental Notebooks for Schools: One early action that MEDEP committed to undertaking when applying for the MATI grant was aimed at improving air quality in Maine's schools and reducing children and teachers exposure to toxic chemicals. In late 2006, the MEDEP provided reference notebooks to all accredited Maine K-12 school systems and web information specifically designed to address school environmental, health, and safety concerns. The notebook explains in simple language all environmental statutes, regulations, and initiatives by state government and EPA that are aimed at reducing exposure to toxics in school settings.

Unknowns

The ATAC asked the SAS to develop criteria for evaluating previously unknown air toxics, and whether any previously unknown air toxics should be added to the ATPL. Maine DEP developed a white paper on unknowns which it revised based on comments of the SAS. Subsequent to development of the whitepaper, the European Community and Canada have developed protocols for evaluating the host of compounds that are used in commerce, but which have not been evaluated for health risks. DEP will monitor the findings of these systems to see if other pollutants should be added to the ATPL. At this time, SAS is not recommending that additional pollutants should be added to the ATPL.

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